

Digital Water Technological Developments and the Water Sector

Jon Rains

Water Hub Chair

May 22nd 2017



- Infrastructure goes digital, Jaimie Johnson, Bryden Wood
- BIM developing data assets in line with industry objectives, Andrew Cowell, MWH & Chair of BIM4Water.
- Beyond Standardisation; Automation of commodity design,
 Jon Rains, Mott MacDonald

Lunch (12:30)

- Round table discussion on specific topics
- Skills and communications, Prof Jason Underwood, University of Salford
- The future is now, Andrew Zhao, Mott MacDonald

Feedback and wrap up (15:30)

Water Hub – Strategic Actions



Network – establish network of champions

Events – compelling events that showcase best practice

Message – develop a compelling case for

offsite manufacture

product-based delivery

standardisation

Communication – develop a multi-channel communication plan and defined terminology

Knowledge – develop an approach to capture/share knowledge and best practice

BIM – establish firm links with **the** BIM4Water group and work in mutual support

Water Hub – Strategic Actions (Longer term)

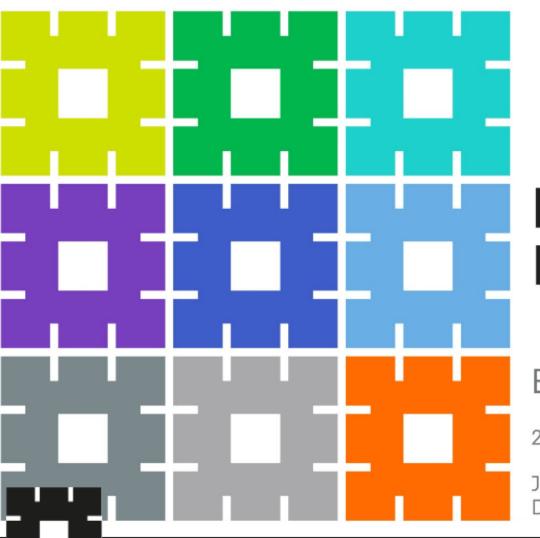


Standards – establish industry-wide standards

Products – share products between water companies

Partnerships – opportunities for co-creation of products; factory sharing

26/06/2017 Mott MacDonald | GoDigital



Data Driven Infrastructure

Bryden Wood's perspective

22 May 2017

Jaimie Johnston Director + Headcof Global Sysytems

BIM - developing data assets in line with industry objectives

Andrew Cowell
Chair BIM4Water





BIM 4 WATER

BIM4Water's mission is to facilitate organisations in the water sector with the adoption of Building Information Modelling (BIM).....Better Information Management

- 4 meetings a year
- Task Groups for priority areas
- Collaborate with other groups
- Connect with BIM4Communities, UK BIMALLIANCE and BIM Task Group























Owner/Operator Group



BIM4Water with British Water facilitated meetings









Developing data assets in line with industry objectives

Understanding Organisational Information Requirements

Creating and caring for digital assets

 Moving from 'projects and documents' to 'assets and data' in support of service delivery

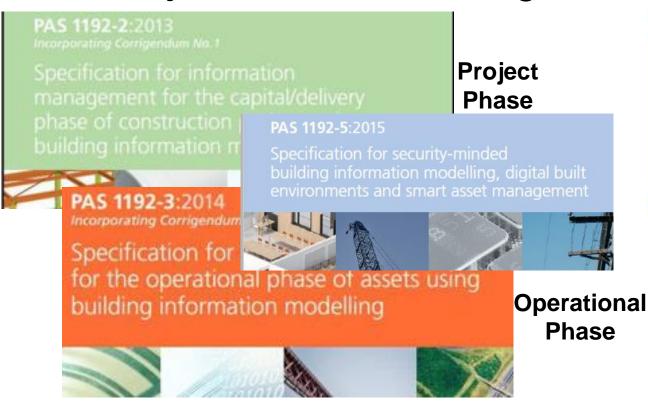
Creating a standardised framework will benefit us all



BIM 4 WATER

Better Information Management is the

Objective.....using BIM



ASSET MANAGEMENT
INFORMATION MANAGEMENT
DELIVERY PHASE
(PIM)

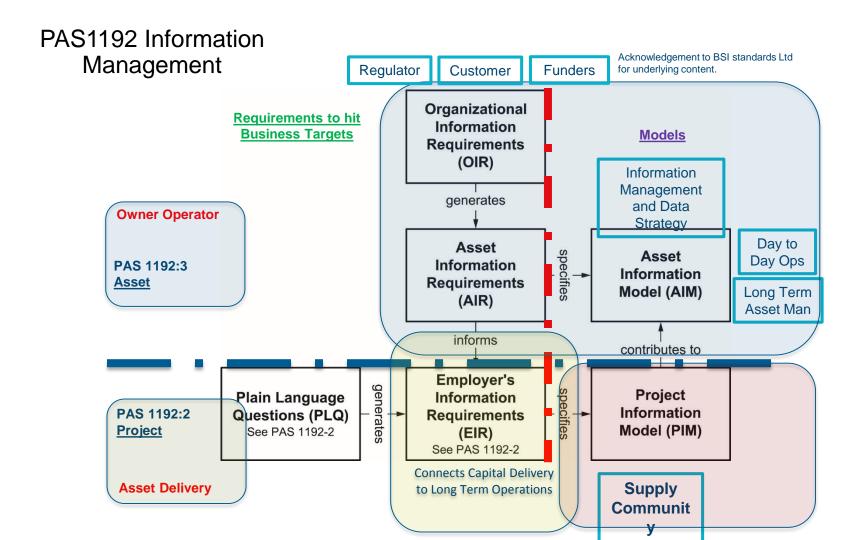
(AIM)
OPERATIONAL PHASE
ISO 19650
ISO 55000

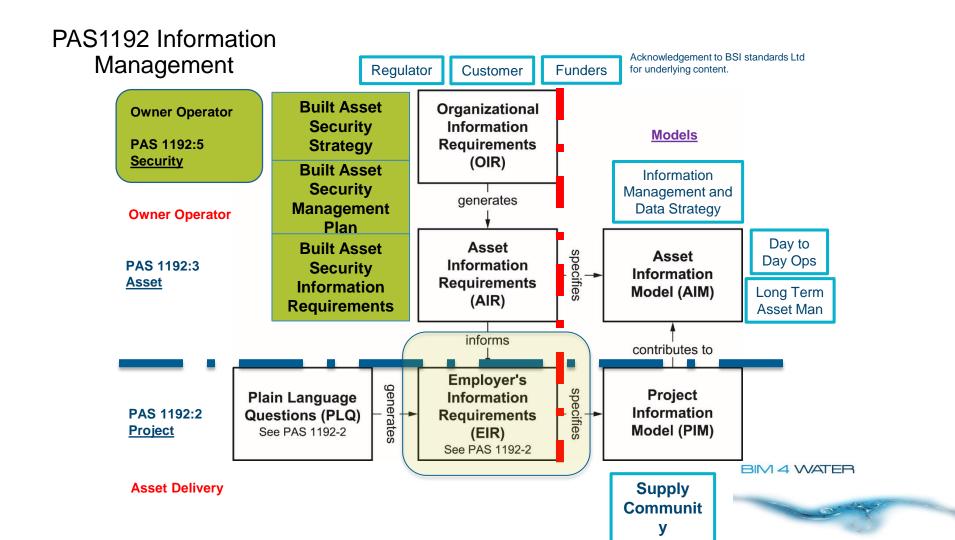
ORGANIZATIONAL MANAGEMENT

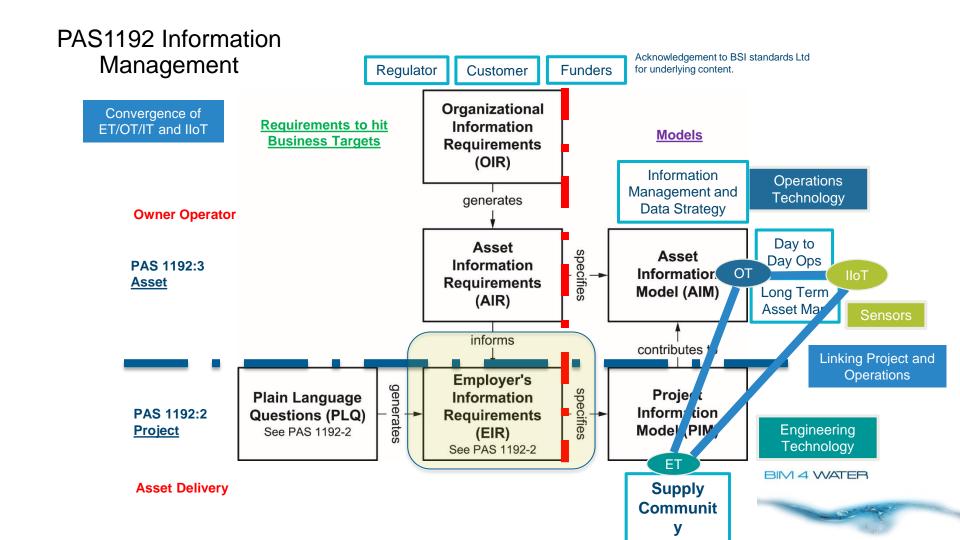
BIM ISO 19650 aligns with ISO 55000 and 9001

ISO 9001

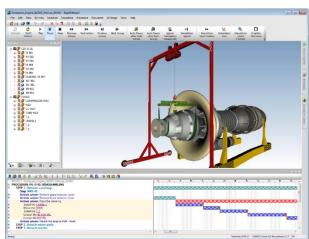
BIM 4 WATER







Digital Assets and Physical Assets



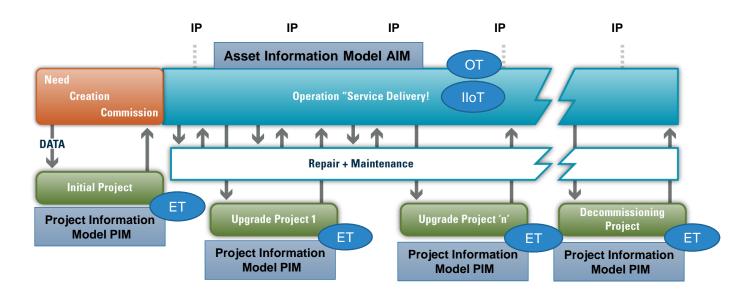








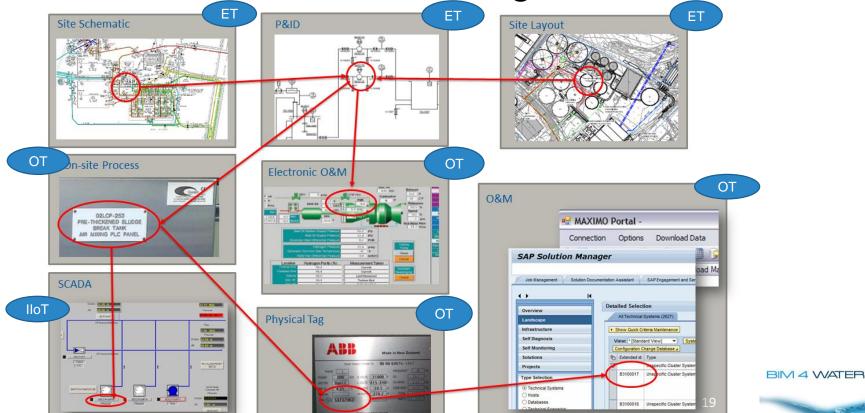








Integrated & Coordinated Information ET/OT/IT and IIoT Convergence



AMP6.....learning digital skills

BIM an Enabler

BIM Value 80% Opex 20% Capex

PR19

AMP6 AMP1-AMP5 Delivering **Employers Information Requirements** Common Data Environment **Programmes BIM Execution Plans** Product Data Templates **Asset Information Model**

Project Information Model

Capital

Assets buried in Projects

Data buried in Documents

AMP7 **Asset Data**

Delivering a more **Enabled Customer**

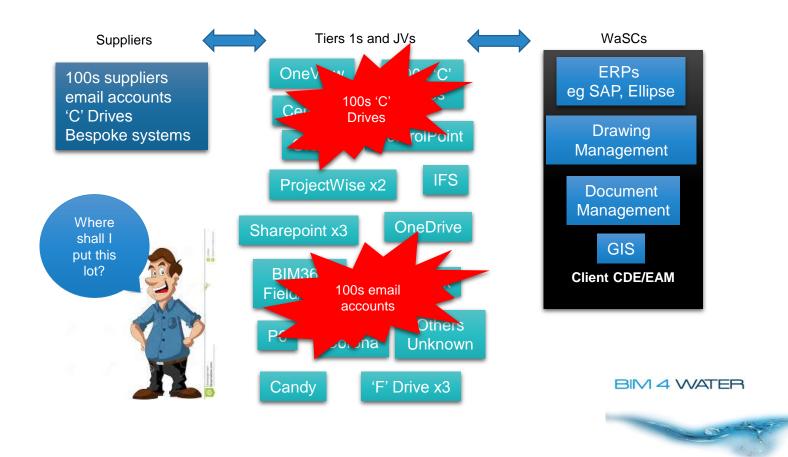


Reduced Totex Standard Assets Reduced Carbon Safer Capex **Safer Operations** Improved AM

BIM 4 WATER



Where is our data?





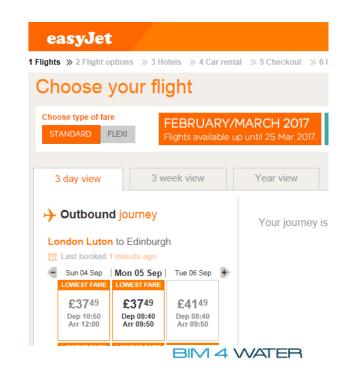
Dear Mr Easyjet please book me.....







Data entry, date, time, locations



AMP7 Built on a Solid Base

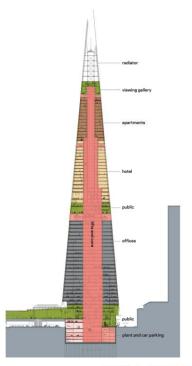
Digitally Enabled Service





AMP6 Foundations

Employer's Information Requirements
Common Data Environment
New Digital Delivery Processes
Digitally Upskilled Workforce







- Equity investment linked to quality business plans. Better asset information supports the business plans, asset condition and performance data.
- Risk and uncertainty management flexibility. Better data allows scenario modelling in the virtual world.
- Efficiency. Construction cost saving (15-20% Construction 2025), opex savings through better asset data moving away from reactive O+M.
- Resilience, hard and soft infrastructure. Better modelling to scenario plan and also better data to recover from unplanned incidents.
- Customer engagement. Data and information to inform about incidents, show in virtual reality planned activities.
- Greater use of markets > £100m projects. Better asset data knowledge gives confidence to constructors and investors.
- Water industry competition. Data about assets supports competition.



Collaboration for Efficiency







MAIN	LINE-	-FROM	LONDON	(ST.	Pancras).
LONDON (pasific linearing) in the control of the co	Gran		The state of the s		

Competition within a defined environment

BIM 4 WATER

Opportunities for Collaboration

- 10 f) Standard Products (not asset standards)
- 10 g) BIM enabled Design for Manufacture & Assembly (DfMA)

 10 e) Standards, Computer Aided Design (CAD), 3D Models, Process & Instrumentation Diagrams (PID's) Symbology



BIM4Water

BIM Guidance for the Water Industry Owner Operator

Standard Products and Build off-site



- Already off-site build in
- New single tank with reduced footprint
- 40% reduction in embodied carbon
- CAPEX savings forecast greater than 20% affordability
- 29 projects will use this Standard Product











Guide with some Practical Steps.....



BIM 4 WATER

BIM4Water

BIM Guidance for the Water Industry Owner Operator

- Understand the Organisational Information Requirements
 - Create a data map.....view data as the common thread ET/OT/IIoT
 - Asset Information Requirements....WHAT is required, WHY and WHEN
- Clearly set out Employers Information Requirements
 - Standards fit for digital......Asset Tagging eg Uniclass
 - Common Data Environment......data exchange formats eg IFC
- Training......digital is a change
- Governance.....value data





BIM - developing data assets in line with industry objectives

BIM 4 WATER





in the Water Sector





Beyond Standardisation

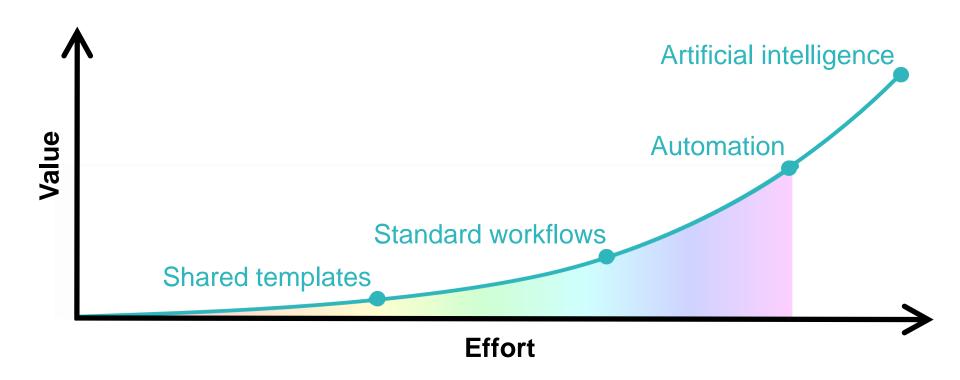
Automation of commodity design

Jon Rains

Water Sector - Knowledge & Innovation Manager

May 22nd 2017

The standardization / automation continuum



Standards & Innovation a contradiction?





Standards & Innovation a contradiction?

- critical design constraints
- collaboration from network effects
- basis for dissemination

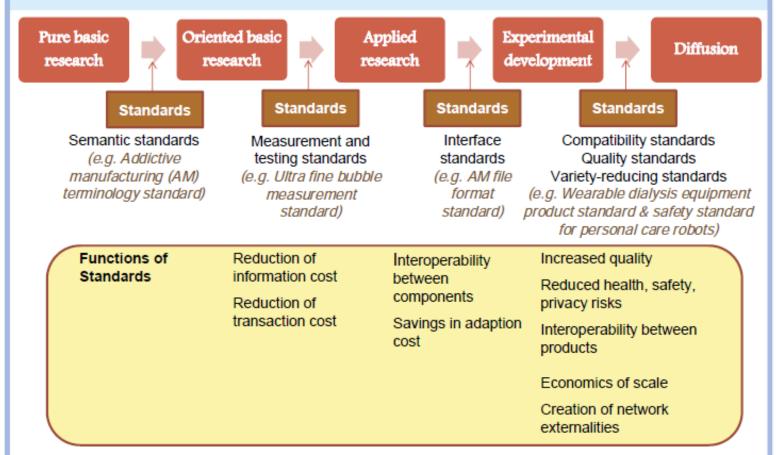
ISO Strategic Plan (2011-2015) is:

"ISO standards promote innovation and provide solutions to address global challenges"

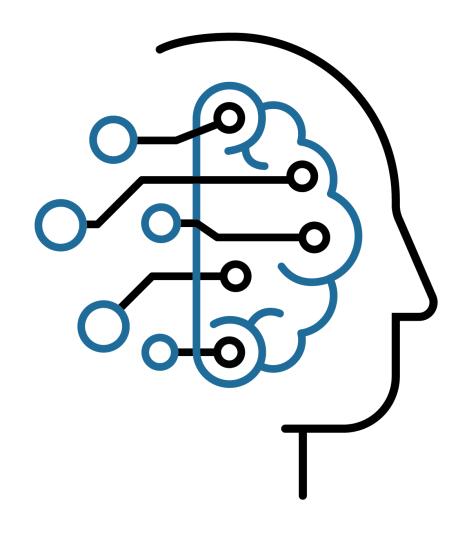


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Standards Supporting R&D & Innovation and Dissemination of R&D Results and Innovation

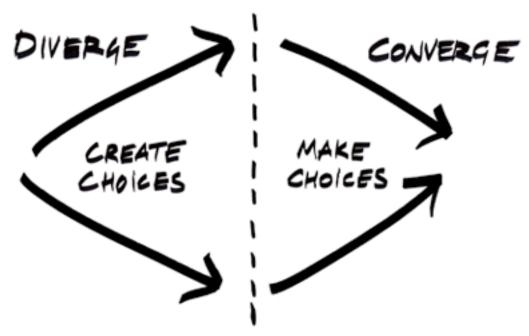


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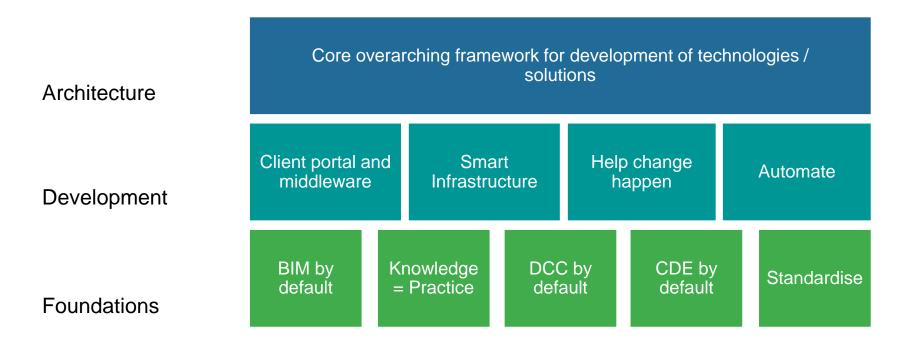


Thinking fast and slow



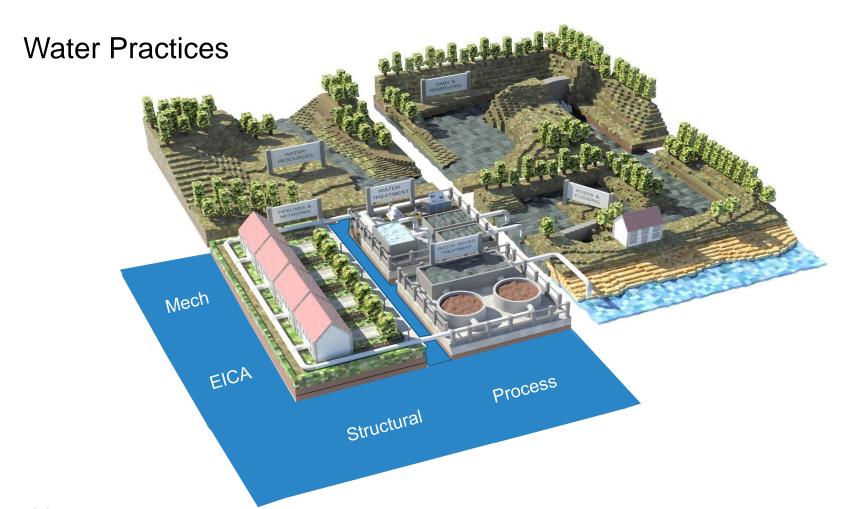


Core Initiatives for Water

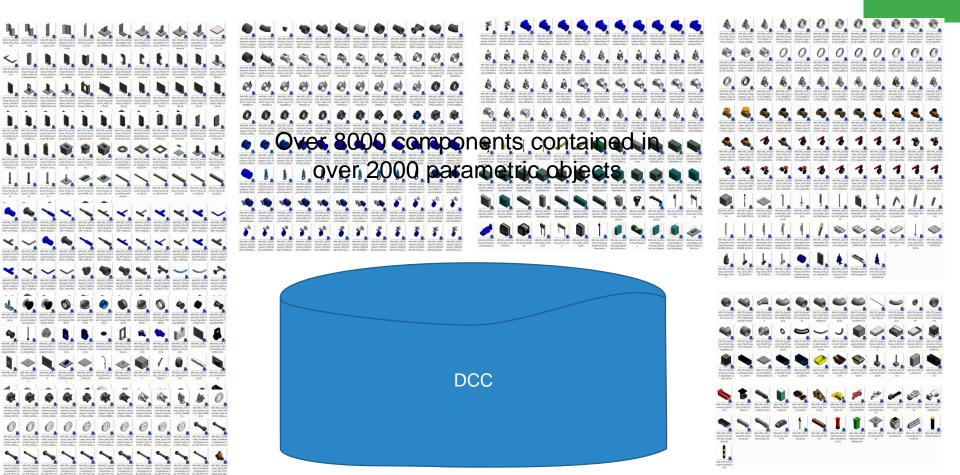


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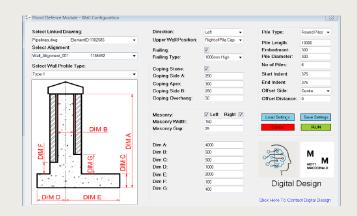
Success Stories - DCC



Success Stories – Digital Design Augmenting Design Processes with Digital

- Pumping Station
- TAP Pipeline Design Automation
- Sheet Piling
- Ground-borne noise and vibration predictions
- Retaining Wall





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Success Stories – MM Common Data Environment

1

DEVELOP

This is where work in progress information is developed by a team before it is shared to others.



PUBLISH

Information here has been coordinated, approved and authorised.



SHARE

Information here has is checked and then shared with other teams.

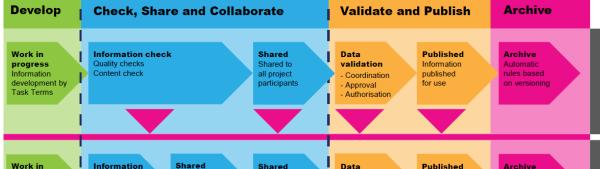


ARCHIVE

Information is recorded throughout the workflow which automatically creates the project archive.

Workflow option 1Shared information is seen

Shared information is seen by the entire project team.



Workflow option 2

Information is first shared with a subset of the project team.

Work in check (team)
Quality checks
Content check
Task Ter

Shared (team) Shared of Shared to Control sharing between Task Terms

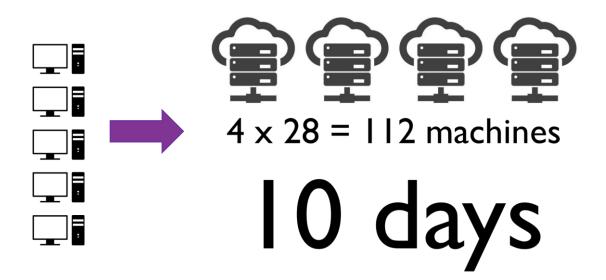
Data validation Published

Archive

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Success Stories – Flood Simulation

5 machines
1800 simulations
12 hours each
6 months



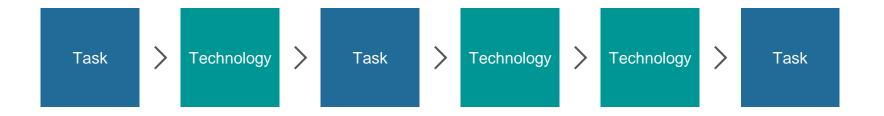
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Step 1: Standardisation



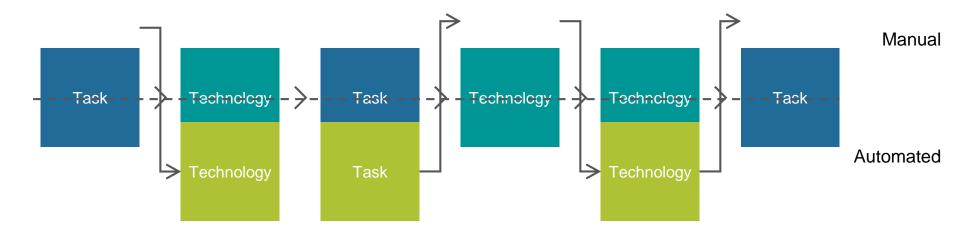
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Step 2: Verified Technology



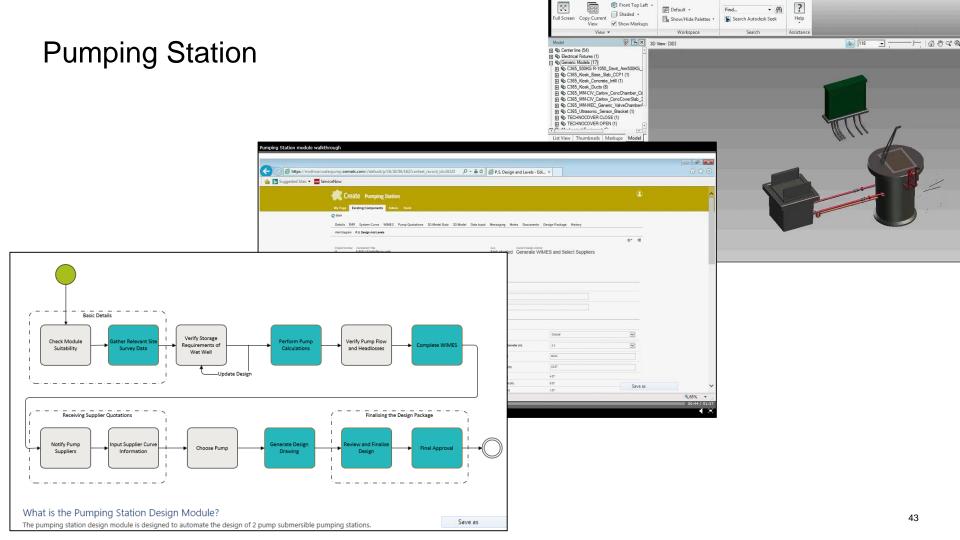
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Step 3: Automation



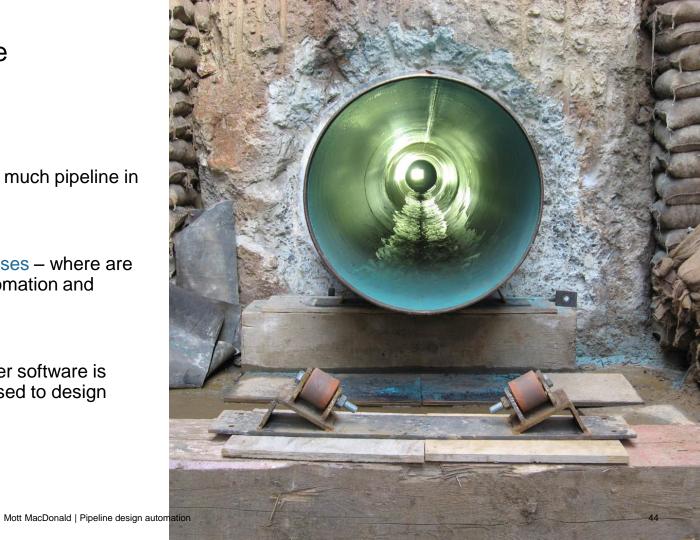
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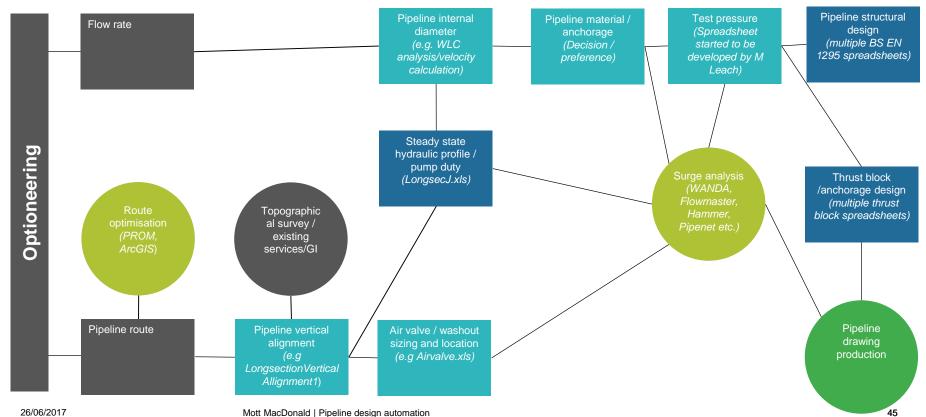
Pipeline – the case

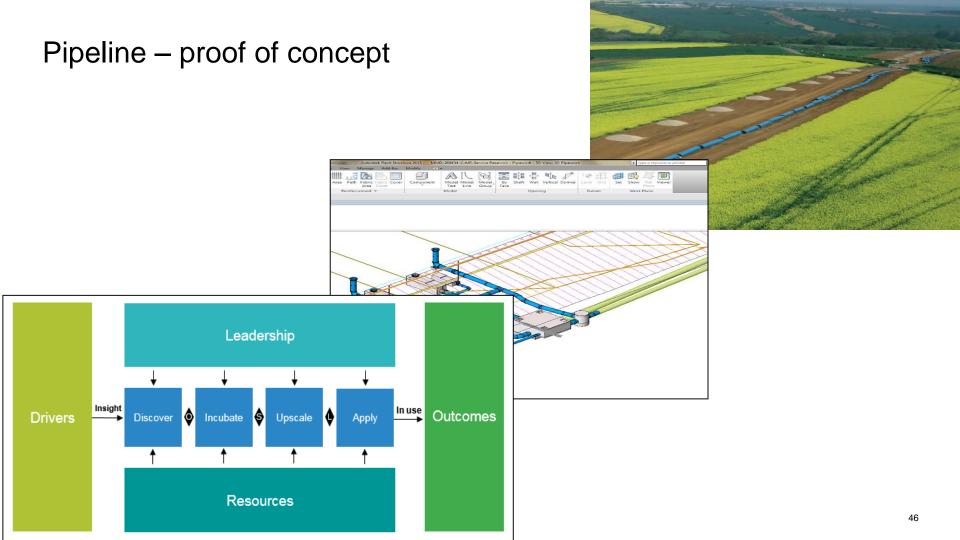
- Market analysis how much pipeline in the pipeline?
- Review existing processes where are the easy wins with automation and standardisation?
- Other tools What other software is available that can be used to design pipelines?



Pipeline - process







Summary

- Standards for Innovation
- Design Automation is here
- Integration is coming
- Programme review opportunities

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Round table topics

1. Standards – Are any missing and needed?

2. Standard products –

- How can BIM enable DfM (Log) A (Oper) ?
- Which Products to develop?
- 3. Automation How can we benefit?
- 4. Digital Environment Top 3 things to do

26/06/2017

Skills and communications Educating/upskilling a digitally transforming industry

Professor Jason Underwood, University of Salford & Chair (UK) BIM Academic Forum

Buildoffsite Water Hub 'Digital Water: Technological Developments and the Water Sector', London, UK







Building Information Modelling (BIM) Task Group



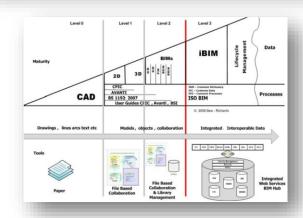
SCOTTISH FUTURES TRUST

Serious commitment



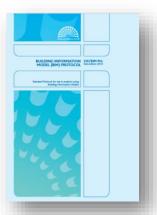






BIM Level 2 is here!



















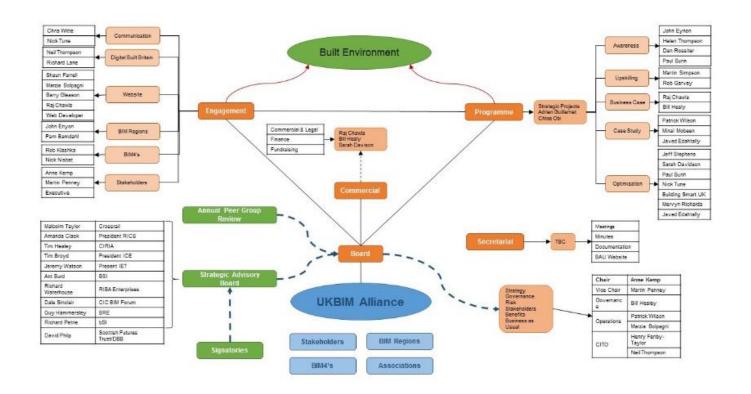






"To make Level 2 BIM business as usual by 2020"

Governance Structure



Behaviours4Collaboration

Aim ... to enable collaboration by specifying the

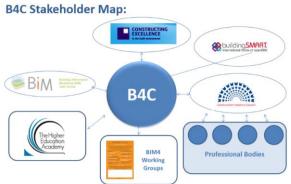
behaviours of collaboration

Factor pairings:

- Trust/Respect
- Silos/T-shaped people
- Openness/Communication
- Common goals/New ways of working
- Leadership/Interpersonal skills



The Profession Map





BIM Task Group LOF

 Understand what BIM is, the contextual requirement for BIM Level 2 and its connection to the Government Construction Strategy and Industrial Strategy 2025; including an understanding of

- .01 Background and the need for collaborative working (removing waste, errors and poor quality/in-complete information)
- 1.02 The value of whole life and whole estate approach rather than capital-led and single asset
- 1.03 The concept of Soft Landings / Government Soft Landings (GSL)
- 1.04 Roles and responsibilities of the supply chain members and clients as part of BIM Level 2 delivery (cultural / behavioural)
- 1.05 External co Strategic

 1.06 Core and extended suits of standards, documents and derivative secretors BM Let
- 1.07 Barriers to successful adoption of BIM Level 2 and how to create the conditions for success
- 1.08 The value of high quality data and the principles of data management
- The key vulnerability issues and nature of controls required to enable the trustworthiness and security of digitally built assets
- Understand the implications and value proposition of BIM within your organisation; including an understanding of:
- 2.01 Implementation implications for the introduction of BIM Level 2 on your organisation and supply chain (e.g. training, management processes and systems)
- 2.02 Organisational change management considerations in context of the introduction of BIM Level 2
- 2.03 Assessment of capability of your organisation and your supply chain (e.g. standard methods of assessment PAS91 Table 8)
- 2.04 Technical, technology and interoperability requirements of Level 2 BIM (Information Management / CDE, model-based design and analysis)



- 2.07 The value, benefits and investment associated with BIM Level 2
- 2.08 How BIM supports the relationship between Design & Construction and Facilities & Asset Management
- 2.09 The potential security threats to built and information assets, and the need for the development of an appropriate and proportionate security risk management approach

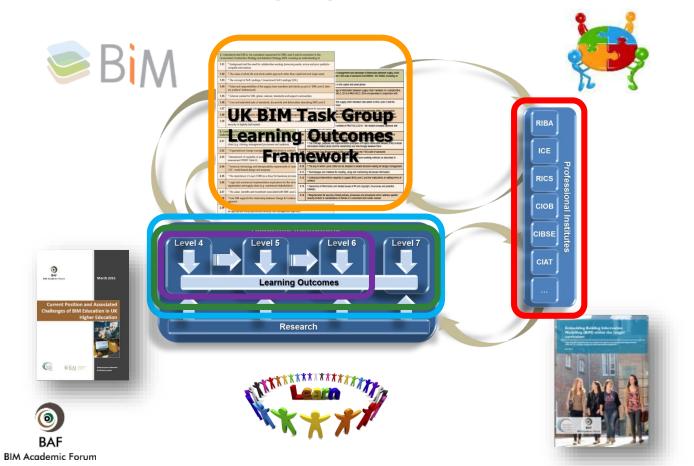
 Understand the requirement for the management and exchange of information between supply chain members and clients as described in the 1192 suite of standards and PASS5 / ISO 55000; including an understanding of:

- 3.01 The purposes for information in the capital and asset phase
- Requirements for the exchange of information between supply chain members in a 3.02 collaborative manner as described in PAS1192-2: 2013 & PAS1192.3: 2014 and provided in conjunction with BS1192:2007
- 3.03 Roles and responsibilities of the supply chain members and clients of BIM Level 2 and the implications on Scopes of Services
- BIM Plain Language Questions, Employers Information Requirements (EIR), Organisation Information Requirements, Asset Information Requirements and the exchange of information between supply chain and client in a collaborative manner in context of PAS1192.2: 2013 and PAS1192.3:2014
- 3.05 Bill Execution Plan (BEP) in context of PAS1192.2243 the related concepts, purpose and concepts and
- 3.07 The Concept, purpose and implementation principles of Project Information Models (PIM) & Asset Information Models (AIM) and the relationship and interchange between them.
- 3.08 A COMMETTE COET FRANCISCO
- 3.09 BS1192 :2007
- 3.10 The way in which Level 2 BIM can be adopted to benefit decision-making for design management
- 3.11 Technologies and methods for creating, using and maintaining structured information
- Contractual interventions required to support BIM Level 2 and the implications on exiting forms of contract
- 3.13 Ownership of information and related issues of IP and copyright, insurances and potential liabilities
- 3.14 Requirements for security-minded policies, processes and procedures which address specific security threats or combinations of threats in a consistent and hoistic manner



Building Information Modelling (BIM)

(UK) BIM Academic Forum





on contracts

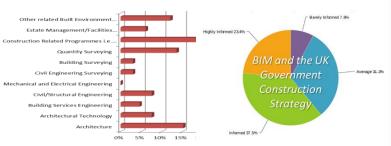
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n Manager) (BIM

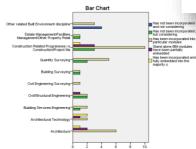
the built

•"To assess the current position and issues of BIM education in UK HE and provide a mandate for future action of BAF"



Neutral

- Direct engagement with the development and delivery of EUV informed incursed as and industry informed incursed.



Count



March 2015

Current Position and Associated Challenges of BIM Education in UK Higher Education



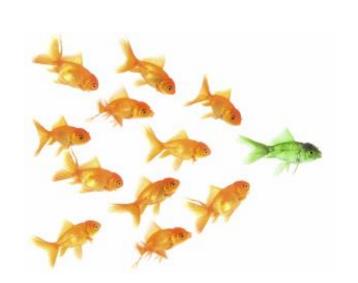




Professor Jason Underwood Dr Oladotun Ayoade

	Follow and change	Track change with industry	Proactively push and
	reactively	at equal pace	lead change
Undergraduate level 4, 5, 6	17	18	28
(NQF)/Level 8, 9, 10 (SCQF)	27.0%	28.6%	44.4%
Postgraduate level 7 (NQF)/Level 11 (SCQF)	14	17	31
	22.6%	27.4%	50,0%



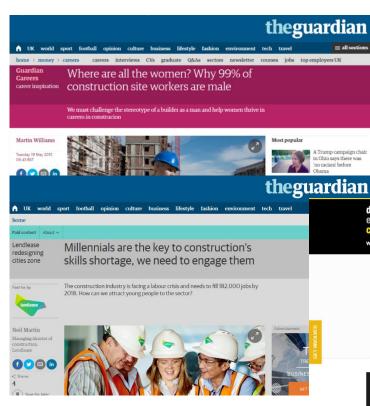




BIM (flavoured) accreditation



BIM4Education



in a comprehensive new survey by Pye Tait Consulting commissioned by the CITB to find out what careers advisers and teachers think of construction, and how best the industry might change their opinions and support

35% of careers advisers believe construction is unattractive.2

Remarks like this one from a teacher in southern England - "I do not think that a career in the construction industry is a good fit for the children I advise" - were sadly all too common. Interestingly, the attractiveness rating of the industry reduced moving down the country from north to south - yet London and the south east is often where construction activity and job opportunities are more plentiful. We need to urgently change the perceptions of careers advisers on construction and educate them about the breadth of opportunities available to their students across the industry and throughout England, Scotland and Wales. Influencers say that the most valuable way of improving the construction industry, careers advisers and young people as a result of 'too much focus on online services'

Equally, Government needs to provide the necessary resources for careers advisers to have the time and space to benefit from such support. Recent changes in career advisery service funding at all levels mean that teachers often have to double up as careers advisers and cannot always do the job justice, although this issue is less prevalent in Scotland.



Meanwhile, the Pye Tait survey reveals how careers advisers in England are desperate for more help from companies to provide information and materials. This is particularly the case with schools, which are already struggling to fulfill legal commitments to offer impartial careers advice to year 9 to 11 pupils, that is 14 to 16 year olds, and are now having to extend this to both younger and older age pupil groups

GET INVOLVED! Call 01282 680946



design...

engineer... EDUCATING

- Design & Technology for the 21st Century · Recognised qualifications for 11-19 year olds
- · Approved for 2018 league table points
- · Increase attainment levels perfect STEM project



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WHAT IS DEC? | WHO BENEFITS? | DEC! BUZZ | COMPETITIONS | DEC! NEWS | RESOURCES | GET INVOLVED











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Andrew Zhao

Emerging Technology Strategist

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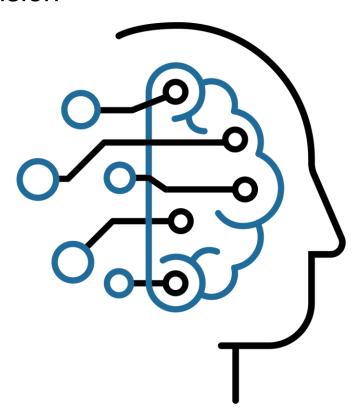
T @andrewyzhao

W mottmac.com





Vision



Be digital by default

GoDigital is about changing mindsets and behaviours – it's about the way we do things.



Strategic Technology Areas



Data Analytics



Cloud Opportunities



Immersive Technologies



Artificial Intelligence



Computational Design



Additive Manufacturing



Sensors



Reality Capture



Drones



Intelligent Mobility



Social Dynamics

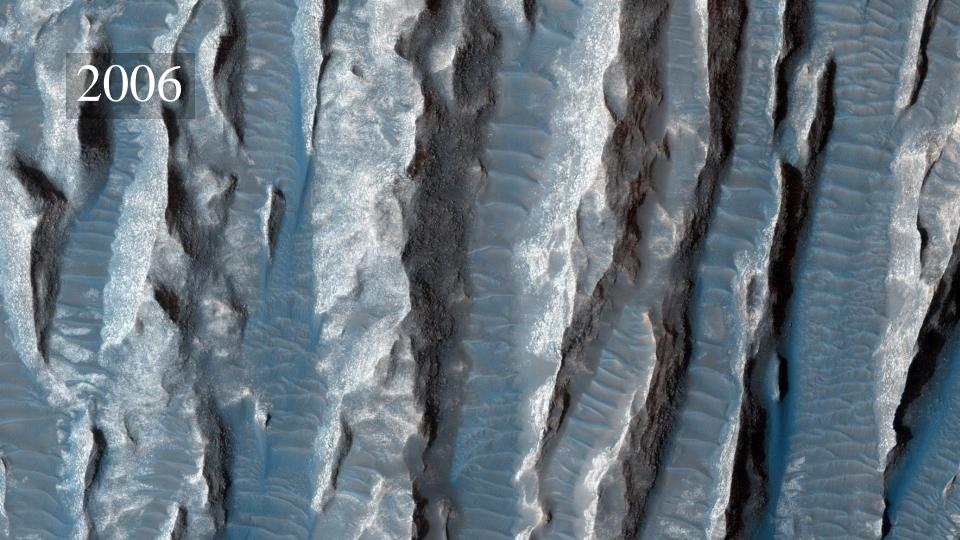
Everything we need to disrupt our industry exists now.

























Nations Unies

Conférence sur les Changements Climatiques 2015

COP21/CMP11





Change happens slowly, but arrives quickly.

















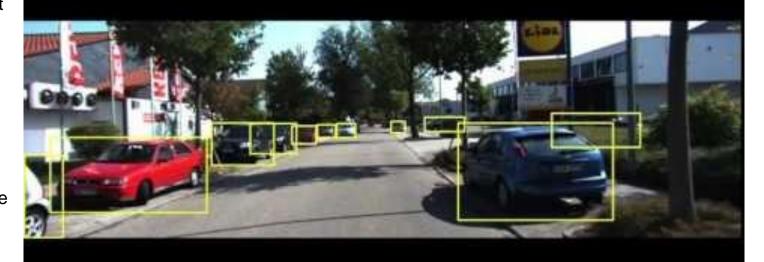




Intelligent Mobility



Artificial Intelligence





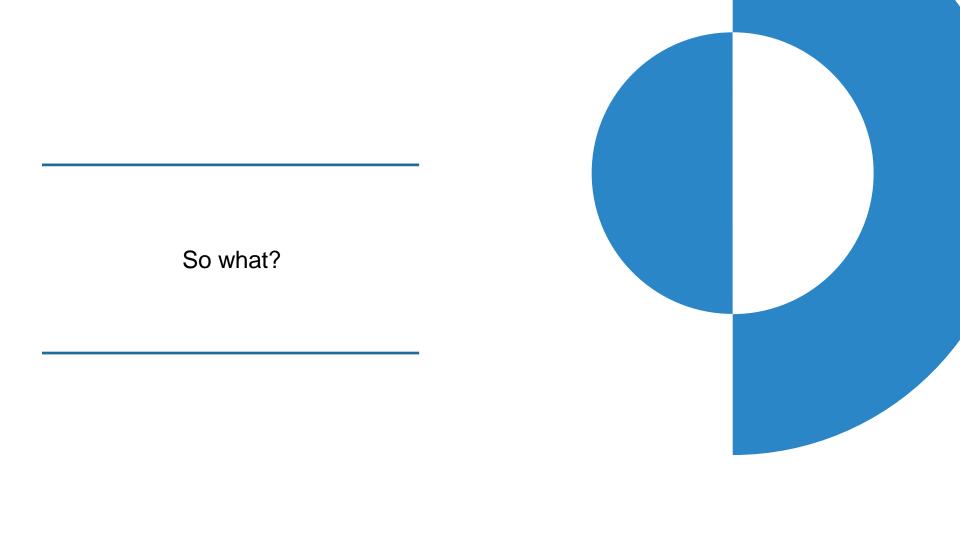
Immersive Technologies





Immersive Technologies





It's what you do with the technology, not the technology itself.



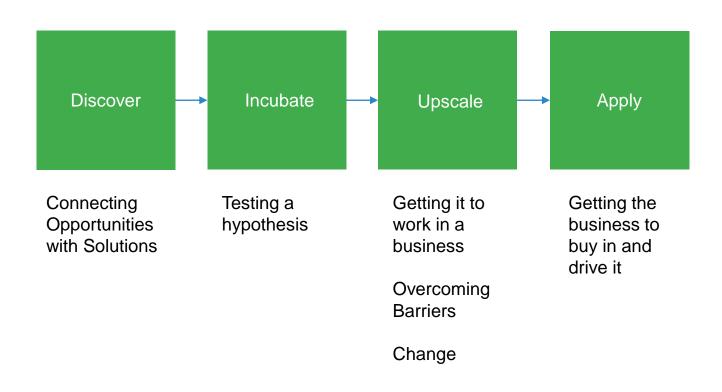








Innovation Process







奇

20+

20+

. 3

20+

Leeds BW Office Join

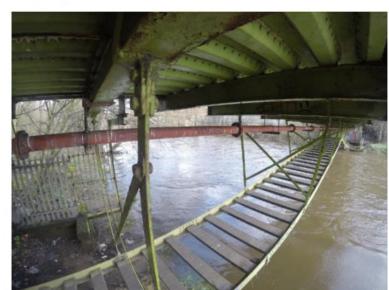


Stuart Davis - March 27 at 12:21pm

The GoPro has been out and about in recent weeks. Last week Harry Tran from Sheffield used it to inspect an access platform underneath a bride spanning a river. This was all carried out safely from the bridge deck by utilising a selfie stick to lower the camera below the decking. The Capture app relayed footage from the camera to a smartphone in real time, making it easy to record the required areas.

Some photos and a brief video from the survey below

cc: Harry Tran







Immersive Technologies



Thank you





Digital Water Technological Developments and the Water Sector

Jon Rains

Water Hub Chair

May 22nd 2017